NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

WASTE FACILITY COVER

(No.)
Code 367

DEFINITION

A fabricated rigid, semi-rigid, or flexible membrane over a waste treatment or storage facility.

PURPOSE

To cover a waste facility for:

- water quality improvement
- air quality improvement
- capture of biogas for energy production

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

- Exclusion of precipitation from an animal waste storage or treatment facility will improve management of an existing or planned system.
- Capture and controlled release or flaring of emissions from an existing or planned agricultural waste storage will improve air quality.
- Bio-treatment of emissions from an existing or planned waste storage or treatment facility will improve air quality.
- Biogas production and capture for energy are components of an existing or planned animal waste system.

CRITERIA

General Criteria Applicable to All Purposes

Laws and regulations. Cover systems for animal waste facilities must be planned, designed, and constructed to meet all Federal, state, and local regulations.

Service life. The cover and appurtenances shall be designed to provide a service life of not less than 10 years

Materials. The type, thickness, and material properties of the cover and any supporting members shall account for all loads and stresses due to operational, environmental, and climatic conditions.

Flexible membrane materials used for fabrication of inflated and floating covers shall be certified by the manufacturer as suitable for the intended application.

The cover manufacturer and/or installer shall warrant the cover for the intended use and design life, provide maintenance instructions, and certify that the cover is properly installed.

Loads. Where applicable, the membrane cover and support system shall be designed to resist snow and wind loads as specified in ASAE EP288.5, Agricultural Building Snow and Wind Loads.

Biogas emissions. The cover system shall provide for capture and control of biogas, bio-reduction and direct release of gaseous

emissions, or contain and release of gaseous emissions, as appropriate.

Capture and control

The cover system shall be designed to capture biogas emissions and transfer to point of discharge without mixing with air. The point of discharge shall be equipped with a flare or utilization equipment as appropriate.

Bio-reduction and direct release

The cover shall be fabricated of a permeable composite membrane designed to promote biological treatment of gaseous emissions. Gaseous emissions pass through the membrane for direct release to the atmosphere.

Contain and release

The cover system is designed for rainfall exclusion and not to specifically capture biogas. Therefore, special handling or treatment of biogas emissions is not required except as necessary to prevent undue safety hazards.

Anchorage. The cover anchorage system shall be designed to resist internal gas pressures, corrosive environment, wind loads, or other forces as appropriate to the cover system.

Repair. New and aged flexible cover materials shall be readily repairable by solvent, adhesive, or thermoplastic welding. Semi-rigid cover material shall be repairable by sectional replacement.

Precipitation. Impermeable covers shall direct precipitation to collection points for removal by pumping or by controlled release to suitable grassed or otherwise stabilized areas for discharge.

Access. Covers shall be removable or otherwise provided with suitable equipment access as necessary for normal operation and maintenance of the waste facility

Safety. The cover shall include safety features including fences and warning signs as appropriate to prevent undue hazards.

As a minimum all covers shall include the following:

- "Warning Flammable Gas" and "No Smoking" signs shall be posted.

Where biogas is captured, the gas collection and control system shall be designed in accordance with standard engineering practice for safely handling a flammable gas.

- Flares shall be located a minimum distance of 95 feet from the biogas source and grounded or otherwise protected to minimize the chance of lightening strikes.
- A flame trap device shall be provided in the gas line between the flare and the waste facility.
- The location of underground gas lines shall be marked with signs to prevent accidental disturbance or rupture.

Additional Criteria for Rigid Covers

Rigid covers shall meet the structural requirements of Florida NRCS conservation practice standard Waste Storage Facility, Code 313.

The cover or cover vessel design shall include provisions for fail safe pressure relief. Maximum pressure shall not exceed 12-inch water column.

Additional Criteria for Inflated Covers

Covers inflated and supported by forced air from mechanical means shall be:

- Equipped with a warning system to notify operator of blower failure.
- Provided with a support system to limit cover collapse in the event the blower fails and for access of equipment.
- Provided with a suitable access port for normal maintenance equipment.

Additional Criteria for Floating Covers

Floating membrane covers shall be supplemented with floatation materials as necessary for proper function, operation, and maintenance.

Minimum membrane or composite membrane thickness shall be 40 mils.

Impermeable floating covers shall be designed with a biogas collection, transfer and control system to control ballooning of the cover and convey biogas to a flare or release oint. The system design shall account for the facilities seasonal emission rates.

Biogas Collection, Transfer, and Control

- Perforated pipe and other components under the cover shall be designed to exclude floating debris and shall have a service life consistent with the cover but not less than 10 years.
- Pipe and components under the cover shall be securely anchored to prevent displacement from normal cover forces.
- All pipe and components shall be designed for wet biogas and include provisions for drainage of condensate and frost protection where appropriate.
- Pipe used to convey biogas can be installed above or below ground with suitable provisions for condensate drainage, pressure and vacuum relief.
- Gas control components shall be conveniently located and sheltered from the elements. A minimum distance of 30 feet shall separate the control system from the covered facility.
- Gas control components shall have a service life of not less than 2 years and shall be readily accessible for replacement or repair.
- The control system shall prevent the backflow of atmospheric air into the system.
- Where electrical service is required at the control facility, the installation and all electrical wire, fixtures and equipment shall meet the National Electrical Code and all state and local requirements.
- The installation shall include a flare to burn off collected biogas. The flare shall be equipped with automatic ignition and powered by battery/solar or direct connection to electrical service. The flare shall have a minimum capacity equal to the anticipated maximum biogas production.

Additional Criteria for Energy Production

The cover materials and all appurtenances, such as weights and floats, shall be designed to capture and convey biogas to the gas collection system. The cover design shall provide for the following:

- Air Infiltration. The cover system and appurtenances, including perimeter soil slopes above the water line for inground digesters, shall be designed to exclude the entrance of air under all operating conditions.
- Material. The minimum material thickness for flexible geomembrane covers shall be 40 mils.
- Gas Collection, Control, and Utilization. The collection of biogas and flaring or other end use shall meet appropriate criteria in Florida NRCS conservation practice standard Anaerobic Digester – Ambient Temperature, Code 365 or Anaerobic Digester – Controlled Temperature, Code 366.

CONSIDERATIONS

Animal waste storage facilities can release large amounts of biogas at certain times of the year. The cover and gas collection system should be designed for release of this gas.

Storage of biogas should be considered when installing flexible covers over storage impoundments (lagoons) to attenuate gas supply for end use or controlled release.

PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended use.

OPERATION AND MAINTENANCE

An operation and maintenance plan shall be developed that is consistent with the purposes of the practice, its intended life, safety requirements, and the criteria used for its design.

When gas storage is included in the system design, the plan shall include instructions as to limits of cover ballooning and emergency procedures if control equipment fails.

REFERENCES

ASAE EP288.5, Agricultrual Building Snow and Wind Loads
Florida NRCS Conservation Practice Standards:
Anaerobic Digester – Ambient Temperature, Code 365
Anaerobic Digester – Controlled Temperature, Code 366
Waste Storage Facility, Code 313